U. S. FOREST SERVICE

RESEARCH NOTE NC-104

NORTH CENTRAL FOREST EXPERIMENT STATION, FOREST SERVICE—U.S. DEPARTMENT OF AGRICULTURE

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PINE ROOT COLLAR WEEVIL HAZARD ZONES FOR RED PINE IN LOWER MICHIGAN

ABSTRACT. — The Lower Peninsula of Michigan is divided into low, medium, and high hazard zones by degree of potential weevil damage. New plantings should be established no closer than 1 mile from a weevil infestation in the high hazard zone or no closer than ½ mile in the medium hazard zone to lessen the probability of those plantings becoming heavily infested.
OXFORD: 453:145.7x19.91 *Hylobius radicis* — **416.3:174.7** *Pinus resinosa*

Red pine (*Pinus resinosa* Ait.), presently the most commonly planted pine in Michigan, is susceptible to attack by the pine root collar weevil (*Hylobius radicis* Buch.). Heavily attacked trees lean or break off at their bases or turn yellow and die from girdling caused by larvae of the weevil feeding at the root collar. Trees between 8 and 15 years old are most susceptible to attack.

The pine root collar weevil occurs throughout northeastern North America. In Michigan, it occurs in the upper half of the Lower Peninsula. Most of the damage is in the western part of that area. Three infestation hazard zones for Lower Michigan are presented here, along with some recommendations for planting red pine to prevent heavy weevil infestations in these zones.

HAZARD ZONES

The Lower Peninsula of Michigan can be divided into weevil hazard zones by degree of potential weevil damage to red pine plantations (fig. 1). The degree of hazard decreases from southwest to northeast.

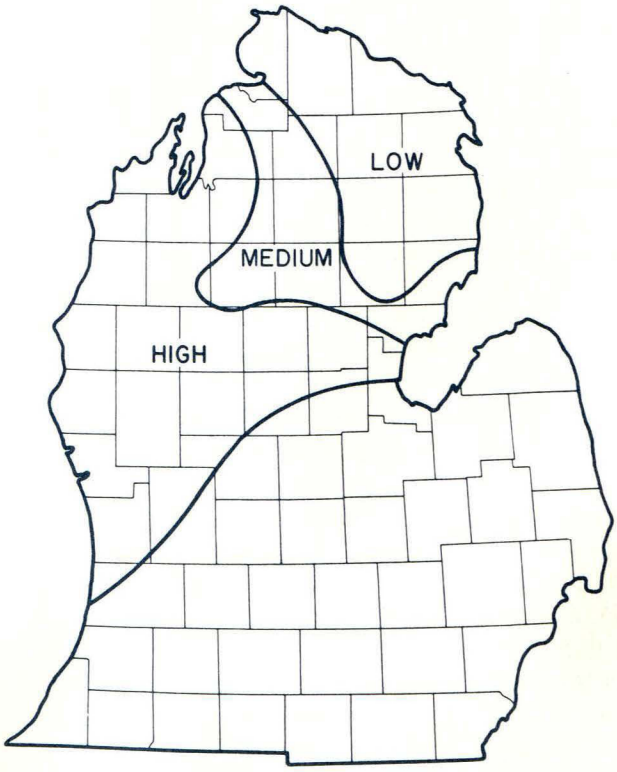

Fig. 1. — Low, medium, and high weevil hazard zones for red pine in Lower Michigan. The weevil hazard in the unmarked zone is unknown.

Also, the distance a planting is from a weevil infestation (in another plantation, a brood tree, or an infested natural stand of pine) affects the probability of a new planting becoming heavily infested within the zones (table 1).

Table 1. — *Probability of heavy damage to red pine from root collar weevil, by hazard zone and distance to a weevil infestation*

Distance to weevil infestation	Hazard zones		
	Low	Medium	High
Miles	Percent	Percent	Percent
0 - 1/8	5	15	>50
1/8 - 1/2	5	10	40
1/2 - 1	5	5	25
1+	< 5	5	10

In the low hazard zone damage is mostly light. Moderately and heavily damaged plantings are rare here. The probability of a new red pine plantation becoming heavily infested in this zone is 5 percent or less regardless of the distance it is from a weevil infestation at the time of planting.

In the medium hazard zone most of the plantations have light to moderate damage. The probability of a new red pine planting becoming heavily infested in this zone varies from 5 to 15 percent depending upon the distance it is from a weevil infestation.

In the high hazard zone plantations are moderately to heavily weeviled. The probability of a pine plantation becoming heavily infested in this zone varies from 10 to more than 50 percent depending again upon the distance it is located from a weevil infestation. Red pine plantations in this zone, established adjacent to infested trees, almost invariably become heavily infested before the trees reach 16 years of age.

Weevil hazard in the lower portion of Michigan is as yet unknown. The few, scattered plantings of red pine in this area are in general free from weevil attack — most likely because of the distance between them.

The light, moderate, and heavy damage classes referred to above show the following symptoms. Lightly damaged plantings appear normal in growth and color, but up to 40 percent of the trees may be scarred at the root collar from larval feeding. In moderately damaged plantings growth is retarded, there is an occasional offcolor or leaning tree, and 30 to 85 percent of the trees may be scarred at the root collar. Heavily damaged plantings contain few to many leaning, offcolor, and/or dead trees, and 80 to 100 percent of the remaining "green" trees may be scarred at the root collar.

RECOMMENDATIONS

Red pine should not be planted where the risk of infestation by the root collar weevil is high because most of the trees will die. Red pine should not be planted where there is a risk of moderate damage either, because many trees may be severely weakened and become vulnerable to attacks from secondary insects and diseases. Red pine can withstand and recover from light damage of this weevil, however, and thus may be planted safely in any situation where light damage might occur except adjacent to infested Scotch pine (*Pinus sylvestris* L.). This host is extremely susceptible to the pine root collar weevil and it somehow permits population buildup to high levels in all zones.

In the medium hazard zones, red pine should be planted no closer than ½ mile from any infested pines — and farther if possible. In the high hazard zone, red pine should be planted at least 1 mile from infested pines, again farther if possible. This zone contains numerous Scotch pine plantings that are reservoirs of the weevil.

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